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RULE 431.1
Sulfur Content Of Gaseous Fuels

(a) Purpose

The purpose of this rule is to reduce sulfur oxides (SO_x) emissions from the burning of gaseous fuels in stationary equipment requiring a permit to operate by the South Coast Air Quality Management District (District).

(b) Definitions

(1) BURN means to combust any gaseous fuel, whether for useful heat or by incineration without heat recovery, except for flaring of emergency vent gases.

(2) CONTINUOUS EMISSION MONITORING SYSTEM (CEMS) is a system of equipment that continuously measures and records all parameters necessary to directly determine concentrations and/or mass emissions of selected pollutants, and which meets all of the requirements of Attachment A, Section II.

(3) CONTINUOUS FUEL GAS MONITORING SYSTEM (CFGMS) is a system of equipment that continuously measures and records total sulfur concentration in the gaseous fuel prior to burning, and which meets all the requirements of Attachment A, Section I.

(4) DAILY AVERAGE is an arithmetic mean of all the sulfur compounds readings within a calendar day obtained according to the guideline specified in Attachment A.

(5) EMERGENCY VENT GAS is any gas released from a process unit as a result of any process upset or breakdown.

(6) GASEOUS FUEL is any gaseous material which releases heat when burned including, but not limited to, any natural, refinery, field produced, process, synthetic, landfill, sewage digester, or waste gases with a gross heating value of 2670 kilocalories per cubic meter (300 BTU per cubic foot) or higher, at standard conditions.

(7) LANDFILL GAS is any gas derived through any biological process from the decomposition of organic waste buried within a waste disposal site.

(8) MONTHLY WEIGHTED AVERAGE SULFUR CONTENT is the result of the summation of average daily sulfur contents of the fuel(s) consumed multiplied by the average daily consumption rates of the fuel(s) consumed in any month divided by the total gaseous fuel consumption rate for that month.

(9) NATURAL GAS is a mixture of gaseous hydrocarbons, with at least 80 percent methane (by volume), and of pipeline quality, such as the gas sold or distributed by any utility company regulated by the California Public Utilities Commission.

(10) RECLAIM SO_x FACILITY is a facility that has been included in the RECLAIM (Regional Clean Air Incentives Market) program in accordance with the requirements of Rule 2001 "Applicability", and/or which has been issued a RECLAIM Facility Permit and is subject to the requirements of Rule 2011, "Requirements for Monitoring, Reporting, and Recordkeeping for Oxides of Sulfur (SO_x) Emissions".

(11) REFINERY GAS is any combustible gaseous by-product generated from a petroleum refinery process unit operation, with a gross heating value of 2670 kilocalories per cubic meter (300 BTU per cubic foot) or higher, at standard conditions.

(12) SEWAGE DIGESTER GAS is any gas derived from anaerobic decomposition of organic sewage within its containment.

(13) SMALL REFINER means any person owning or operating a facility in California that produces materials from processing of petroleum crude provided such facility:

(A) has and at all times had since January 1, 1978, a crude oil capacity of not more than 55,000 barrels per stream day; and

(B) has not been, at any time since September 1, 1988, owned or controlled by any refiner that at the same time owned or controlled refineries in California with a total combined crude oil capacity of more than 55,000 barrels per stream day; and

(C) has not been at any time since September 1, 1988, owned or controlled by any refiner that at the same time owned or controlled refineries in the United States with a total combined crude oil capacity of more than 137,500 barrels per stream day; and

(D) has received a two-year extension for compliance with California Air Resources Board's Phase II Reformulated Gasoline Requirements.

(14) STANDARD CONDITIONS is the atmospheric state where the temperature is $60^{O}F$ and barometric pressure is 14.7 pounds per square inch absolute.

(15) STREAM DAY is any day or part of a day when a facility or a process unit is in operation.

(c) Sulfur Content Requirements

(1) Natural gas

A person shall not sell or offer for sale for use in the jurisdiction covered by the District natural gas containing sulfur compounds in excess of 16 parts per million by volume (ppmv) calculated as hydrogen sulfide.

(2) Small Refiners Refinery gas

Anytime prior to May 4, 1996, a small refiner shall not:

(A) sell any refinery gas containing sulfur compounds in excess of 80 ppmv calculated as hydrogen sulfide, or

(B) burn or discharge to any fuel gas system or vent gas disposal system, refinery gas containing sulfur compounds in excess of 800 ppmv calculated as hydrogen sulfide, unless sulfur compounds in the stack gases are reduced to a level below that which would be emitted when using a fuel which complies with the requirements of this paragraph.

For purposes of this paragraph, the 80 or 800 ppmv limit shall apply to any gaseous fuel vented from a process unit or, if applicable, as vented from a sulfur removal unit. On or after May 4, 1996, the applicable sulfur compounds content limit for small refiners refinery gas shall be as specified in paragraph (c)(3) of this rule.

(3) Other Gaseous Fuels

On or after the applicable compliance dates specified in Table 1, a person shall not burn, purchase, sell or offer for sale for use in the jurisdiction of the District, any gaseous fuel containing sulfur compounds calculated as ppmv hydrogen sulfide, in excess of the concentration limits as measured over the averaging periods for various gaseous fuels as specified in Table 1.

TABLE 1

Fuel Type	Sulfur Limits ppmv	Averaging Period	Compliance Date On or After
Refinery Gas			
Small Refiners	40	4 hrs	May 4, 1996
Other Refiners	40	4 hrs	May 4, 1994
Landfill Gas	150	Daily	November 17, 1995
	40 or	Daily or	July 1, 1997
	40 and 200	Monthly and15-minutes	July 1, 1997
Sewage Digester Gas	40 or	Daily or	November 17, 1995
	40 and 500	Monthly and 15-minutes	November 17, 1995
Other Gases	40	4 hrs	May 4, 1994

(A) Landfill gas and sewage digester gas

(i) A person who complies through monthly averaging shall install and properly operate a continuous monitor that complies with the requirements specified in subdivision (d) of this rule. Compliance shall be determined based on readings obtained from the approved CFGMS or as calculated from the approved CEMS reading.

(B) Optional Facility Compliance Plan ("OFCP")

A person may comply with paragraph (c)(3) by achieving equivalent sulfur oxides (SO_x) emission reductions within the facility, provided that the applicant submits and complies with an Optional Facility Compliance Plan ("OFCP") which has been approved in writing by the Executive Officer or designee. The OFCP shall:

(i) Contain, at a minimum, all data, records, and other information necessary to determine eligibility for alternative emission control, including but not limited to:
- (I) A list of equipment and a description of the equipment where the gaseous fuel is being produced and/or burned;
- (II) Amount of fuel produced by and/or to be burned in each of the equipment listed above;
- (III) The estimated emission of sulfur dioxide from each equipment; and
- (IV) Historical and projected information on fuel usage;

(ii) Demonstrate that daily total SO_x emissions under the OFCP from all sources within the facility regulated under Rule 431.1 would be less than or equal to SO_x emissions that would have been emitted based on actual total SO_x emissions from each source, or the sulfur content limits of this rule, whichever results in lower SO_x emissions. The total SO_x emissions generated from the subject fuel shall be determined using a continuous emission monitoring system (CEMS) specified in subdivision (d). The total emissions may be determined by monitoring the sulfur dioxide emissions from at least 70 percent of the total fuel gas consumed as obtained from a totalizing meter, and calculating the total emissions using the CEMS data;

(iii) Demonstrate that the permit units subject to the specified rule emission limitations are in compliance with all applicable District rules or are on an approved schedule of compliance; and

(iv) Demonstrate that continuous monitoring requirements of SO_x emissions specified in subdivision (d) of this rule are complied with.

(4) Previously Exempt or Compliant Facilities

A person burning gaseous fuel containing sulfur compounds in excess of the limits specified in Table 1 and whose facility had been previously exempt from this rule pursuant to paragraph (g)(8); or any person who, without the use of any sulfur removal or control system, had been previously in compliance with the limits specified in Table 1, shall:

(A) submit for approval by the Executive Officer or designee within 30 days from the time of exceedance or non-compliance, a plan to demonstrate compliance with the requirements of the rule;

(B) submit to the Executive Officer or designee an application for a fuel gas control system within six months of the time of exceedance of the exemption criteria specified in paragraph (g)(8), or non-compliance with the limit;

(C) demonstrate compliance with the limit specified in Table 1 no later than eighteen (18) months after the time of exceedance, or by July 1, 1997, whichever is later; and

(D) comply with paragraph (d)(3).

(d) Monitoring Requirements

(1) A person burning landfill gas or sewage digester gas in stationary equipment requiring a permit to operate by the District shall install and properly operate a

continuous fuel gas monitoring system (CFGMS) to determine the sulfur content of the fuel gas prior to burning, or a continuous emission monitoring system (CEMS) to determine SO_x emissions after burning. Such continuous monitor shall be approved according to the requirements as set forth in Attachment A. An alternative method that ensures adequate compliance with the daily total sulfur content limitation of paragraphs (c)(1), (2) and (3) of this rule may be used upon written approval by the Executive Officers of the District, the California Air Resources Board (CARB), and the Regional Administrator of the Environmental Protection Agency (EPA), Region IX, or their designees. At a minimum, the alternative method shall meet the specifications of Attachment A, Section III.

Prior to the final compliance date specified for landfill gas in Table 1, a person burning landfill gas may comply with the monitoring requirements specified in this paragraph, if data regarding total sulfur content of the landfill gas is contained and submitted to the District in a Rule 1150.1 plan.

(2) A person burning gaseous fuels other than natural gas, landfill gas, or sewage digester gas in stationary equipment requiring a District permit to operate shall install and properly operate a CFGMS to determine the total sulfur content of the gaseous fuel prior to burning, or a CEMS to determine the sulfur oxides (SOx) emissions after burning according to the applicable requirements set forth in Attachment A. A person shall not mix refinery gases with natural gas, propane or other fuels upstream of the monitoring device.

(3) A person subject to (c)(4) of this rule who burns gaseous fuels containing sulfur compounds in excess of the limits specified in Table 1, shall install and properly operate a CFGMS to determine the sulfur content in the fuel gas prior to combustion, or CEMS to determine the sulfur oxide emissions after burning, within twelve months from the date a Permit to Construct a sulfur removal system is issued. Such monitor shall be approved according to the requirements of Attachment A, or an alternative method may be used upon approval by the Executive Officers of the District and CARB, and the Regional Administrator of the EPA, Region IX, or their designees.

(4) A person installing a continuous monitor shall submit to the District for approval, a quality assurance procedure specified in EPA 40 CFR 60, Appendix F, Procedure 1 for CEMS and, as applicable, for CFGMS.

(A) The quality assurance procedure specified above shall be approved in writing by the Executive Officer or designee before the CFGMS or CEMS final certification.

(B) Any CFGMS or CEMS deemed to be out of control, as specified in Attachment A, according to the facility quality assurance procedure approved by the Executive Officer or designee shall be corrected within 72 hours, as demonstrated by meeting the performance specification for which it was deemed out of control.

(i) The person operating the CFGMS or CEMS shall notify the Executive Officer or designee by telephone or facsimile of any breakdown(s) of the monitoring systems if the duration of the breakdown is in excess of 60 minutes or if there are three or more breakdowns in any one day within 24 hours of the occurrence of the breakdown which triggers notification. Such report shall identify the time, location, equipment involved, and contact person.

(ii) The person shall keep a record of any breakdown of the monitors and shall maintain such record for at least two years, and make it available to the District staff upon request.

(iii) The person who complies with the provisions of clauses (d)(4)(B)(i) and (ii) shall not be considered in violation of this rule for the 72 hour period of breakdown.

(e) Reporting and Recordkeeping Requirements

(1) Except at electric utility generating facilities and refineries, a person burning gaseous fuel other than natural gas in stationary equipment requiring a District permit to operate, shall submit to the Executive Officer or designee annual reports of the monthly fuel consumption and the total sulfur content of the fuel consumed. Such report shall be submitted 60 days following the end of the reporting year, and shall consist of the amount of any gaseous fuel consumed monthly, the monthly average sulfur content as determined by the device specified in paragraph (d)(1), (d)(2), or (d)(3) of this rule, and total SO_x emissions.

(2) A person burning gaseous fuel in stationary equipment located at electric utility generating facilities or refineries shall submit to the Executive Officer or designee monthly reports of the daily fuel consumption, the monthly weighted average sulfur content (except for natural gas), and the maximum 4-hour average sulfur content of the fuel consumed, as determined by the device specified in paragraph (d)(2) of this rule and the total SO_x emissions. The report shall be submitted within 30 days following the end of the reporting month.

(3) The information specified in paragraphs (e)(1) and (e)(2) shall be maintained at the facility for at least two years, and be made available to the District staff upon request.

(f) Test Methods

The following may be used by the Executive Officer or designee to verify compliance with the provisions of this rule:

(1) For determination of compliance with sulfur content requirements of subdivision (c):

(A) The reference method for determining the concentration of sulfur compounds in a gaseous fuel, calculated as hydrogen sulfide, shall be District Method 307-91 - Determination of Sulfur in a Gaseous Matrix, or any other method demonstrated by the applicant to be equivalent and approved in writing by the Executive Officers of the District, the CARB, and the Regional Administrator of the EPA, Region IX, or their designees, or

(B) Data obtained from a continuous monitor, which is installed and properly operated according to subdivision (d) and as approved by the Executive Officer or designee pursuant to the guidelines specified in Attachment A.

(2) The gross heating value of gaseous fuels shall be determined by ASTM Method D 3588-91 or, if applicable, ASTM Method D 4891-89.

(3) The methane content of gaseous fuels shall be determined by ASTM Method D 1945-81.

(g) Exemptions

Unless otherwise specified, and provided that the person seeking the exemption supplies proof and verification upon request of applicable criteria to the satisfaction of the Executive Officer or designee, the provisions of this rule shall not apply to the following cases:

(1) A person selling, for use in the jurisdiction of the District, any gaseous fuel not complying with paragraphs (c)(1) through (c)(3) provided that:

(A) The gaseous fuel is delivered directly to a sulfur removal unit which is in full operation and which reduces the sulfur content to the limits specified in paragraphs (c)(1) through (c)(3); and

(B) The seller notifies the Executive Officer or designee prior to any such sale of the quantity, heating value, and composition of the gaseous fuel to be sold; and

(C) The buyer has an approved Permit to Construct and/or Operate for the sulfur removal unit that will be used to treat the purchased gas.

(2) Gaseous fuels containing sulfur used in the production of sulfur or sulfur compounds.

(3) Waste gases being burned provided that:

(A) The gross heating value of such gases is less than 2670 kilocalories per cubic meter (300 British Thermal Units per cubic foot) at standard conditions; and

(B) Any supplemental fuel used to burn such waste gases does not contain sulfur or sulfur compounds in excess of the amount specified in this rule.

(4) Gases being burned from fluidized catalytic cracking unit (FCCU) regenerators subject to District Rule 1105 or Regulation XX.

(5) Gases vented during refinery turnaround pursuant to District Rule 1123 or Regulation XX.

(6) Gases vented to a control system pursuant to District Rule 466 and 1173 or Regulation XX.

(7) Gases vented intermittently to fuel gas or waste disposal system from pressure control valves, sight glasses, compressor bottles, sampling systems, and pump and compressor case vents.

(8) Any facility which emits less than 5 pounds per day total sulfur compounds, calculated as hydrogen sulfide, from the burning of gaseous fuels other than natural gas. Emissions of total sulfur compounds shall be measured based on fuel analysis, using the test method specified in paragraph (f)(1), and the maximum daily gaseous fuel consumption. This exemption shall not apply to the requirement of paragraph (c)(1).

(9) A person is exempt from the requirements of paragraph (d)(1) and (d)(2) if the person demonstrates to the satisfaction of the Executive Officer or designee that the supplier of the gaseous fuel has complied with the requirements of subdivision (d) for such fuel.

(10) Until November 17, 1997, any gaseous fuel sold or purchased in a transaction between a RECLAIM SO_x facility and a Non-RECLAIM SOx facility is exempt from the sulfur content requirements specified in paragraphs (c)(1), (2) and (3), provided that:

(A) both the buyer and seller of the gaseous fuel submit to the Executive Officer or designee monthly written report of the quantities and daily averages of the total sulfur contents of the gaseous fuel sold to the buyer or purchased from the seller. The daily average of total sulfur contents of gaseous fuels shall be monitored and reported to the District in a manner and format specified by the Executive Officer or designee. Such report shall be submitted within 30 calendar days following the end of the reporting month; and

(B) the RECLAIM SO_x facility reports to the District and includes all SO_x emissions generated from the burning of such gaseous fuel, as part of the facility's total SO_x emissions pursuant to Rule 2004.

(11) On or after July 1, 1997, a person previously in compliance with the limits specified in Table 1 of this rule shall be exempt from the requirements of paragraph (c)(4) provided that: the alternative monitoring method pursuant to paragraph (d) yields no more than three individual readings in a calendar year in excess of the limits specified in Table 1; that no single reading exceeds a fuel sulfur limit of 50 ppm; and that the sampling frequency is no longer than once per week.

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ATTACHMENT A

SECTION I - REQUIREMENTS FOR CONTINUOUS FUEL GAS MONITORING SYSTEM (CFGMS)

A continuous fuel gas monitor used for determining the sulfur content of any gaseous fuel shall:

(1) Continuously monitor and record the concentration by volume (dry basis) of sulfur compounds in the gaseous fuel.

(2) Have the span value of the monitor set so that all readings fall between 20 and 95 percent of scale.

(3) Check for calibration drift of the monitoring system at least once daily (approximately 24-hr interval) at two concentrations, one high level and one low level. Whenever the daily high level or low level calibration drift exceeds 5% of analyzer full scale span, the monitoring system shall be deemed to be out of control and subject to the requirements of subparagraph (d)(4)(B) of this rule.

(4) Determine the relative accuracy of the monitor which shall be no greater than 20 percent of the mean value of the reference method test data.

(5) Be able to record negative values of zero drift.

(6) Report the concentration of the sulfur compounds calculated as hydrogen sulfide.

SECTION II - REQUIREMENTS FOR CONTINUOUS EMISSIONS MONITORING SYSTEMS (CEMS)

A stack CEMS used for monitoring the sulfur dioxide emissions from the burning of any gaseous fuel shall:

(1) Continuously monitor and record the concentration by volume (dry basis, zero percent excess air) of sulfur compounds into the atmosphere;

(2) Include either an oxygen monitor for correcting the data for excess air or a fuel gas and exhaust gas flowmeter for the determination of mass emissions;

(3) Have the span value of all the monitors set so that all readings fall between 20 and 95 percent, for four-hour and daily averages, and between 10 and 95 percent, for monthly averages, of full scale;

(4) When using an oxygen monitor for the correction of excess air, be able to measure a sulfur compound concentration emission limit of 5 ppm (dry basis, zero percent excess air), which is stoichiometrically equivalent to the limit of sulfur compound content of 40 ppm calculated as hydrogen sulfide in the gaseous fuels;

(5) Use District Methods 100.1 or 6.1 (as applicable for sulfur compound analysis) and District Method 3.1 (for oxygen content analysis), or District Method 2.1 (for flowrate determination), whichever is applicable, or any other methods demonstrated by the applicant to be equivalent and approved in writing by the Executive Officers of the District and the CARB, and the Regional Administrator of the EPA, Region IX, or their designees, for conducting the relative accuracy evaluations. The relative accuracy limit shall be 1 ppm and zero drift (2-hour and 24-hour) and calibration drift (2-hour and 24-hour) limits for sulfur compounds monitor shall be 5 percent of the span range; and

(6) Check for calibration drift of the monitoring system at least once daily (approximately 24-hr interval) at two concentrations, one high level and one low level. Whenever the daily high level or low level calibration drift exceeds 5% of analyzer full scale span, the monitoring system shall be deemed to be out of control and subject to the requirements of subparagraph (d)(4)(B) of this rule.

(7) Facilities burning fuel gas subject to this rule shall comply with the requirements of Rule 218 except where specific requirements have been incorporated into this rule.

SECTION III - GUIDELINES FOR APPROVAL OF ALTERNATIVE MONITORING PLAN BY THE EXECUTIVE OFFICER

In lieu of a continuous fuel gas monitoring system (CFGMS) or a continuous emission monitoring system (CEMS), a person subject to this rule may submit an alternative monitoring plan to the Executive Officer or designee for his review and decision. Submittal of such a plan must be at least 180 days prior to the applicable compliance date set forth in Table 1. The Executive Officer or designee shall approve or disapprove of such plan no later than 90 days prior to the applicable compliance date set forth in Table 1 based upon whether the alternative monitoring plan includes all of the following:

(1) A test program to determine the correlation between hydrogen sulfide and total sulfur in the fuel gas using District Method 307-91. If a correlation is established, a colorimetric test, or other alternative method approved by the Executive Officer or designee as being equivalent or better in establishing such correlation, may be conducted regularly to determine total sulfur using hydrogen sulfide as a surrogate.

(2) An error analysis between colorimetric, or other approved alternative method readings and the total reduced sulfur analysis obtained from District Method 307-91. To demonstrate equivalency between the two methods of analyses, the relative accuracy shall not exceed 20 percent of average District Method 307-91 readings.

(3) A schedule for a daily or more frequent analysis of the fuel gas for hydrogen sulfide (H_2S) using the colorimetric test, or other approved alternative method, and a minimum weekly analysis of the fuel gas using District Method 307-91. A different frequency of analysis may be used if the Executive Officer or designee determines that such frequency is adequate to ensure compliance with the daily total sulfur limits of this rule.

(4) When the sulfur level is suspected to be at or above the 40 ppmv level as determined by the colorimetric or other alternative method, a procedure to obtain at minimum a daily sample to be tested according to District Method 307-91 until three consecutive daily samples show that total sulfur is below the 40 ppmv limit.